BRANCHING OUT
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Wasted Woodchips—What To Do?

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Arborists and others who trim or remove trees from landscapes are constantly dealing with the enormous amounts of chips that their activities generate. And while a trip to the landfill is one obvious solution, there may also be value in using those chips as mulch around existing trees and other preferred vegetation to suppress weeds, hold soil moisture, improve overall soil organic matter ratios and otherwise improve sites "naturally". One big question that overshadows any efforts to use chips as mulch is whether or not those chips — if from a diseased tree — pose any threat to the health of the trees that are otherwise expected to benefit from the treatment.

A limited number of experiments to confirm that chips infested with pathogenic fungi do, in fact, pose a threat to plant health generally support the contention that chips from diseased trees are "safe" if they are properly composted. But what diseases have been studied in this context? And what's "proper" composting. Let's look at the literature.

A large pile of wood chips is the common result of tree removal or trimming.

First ... the diseases:

Verticillium wilt (caused by the soil-borne fungus, *V. dahliae*) is one that has received more attention than some others, presumably because it is alleged to be responsible for much of the "maple decline" that is so pervasive in the eastern U.S. Furthermore, the pathogen produces minute (about half the size of a grain of salt), thick-walled masses of fungal hyphae known as "microsclerotia" in both soil and diseased plant tissue. These structures ensure that the fungus will survive in the absence of a host plant or favorable growing conditions for decades and their presence, alone, makes *Verticillium* a formidable adversary. Fresh, Verticillium-infested wood chips have been shown to be effective in transferring that pathogen to new sites where it caused disease on both tree and vegetable target plants.

Fresh, Verticillium-infested wood chips have been shown to be effective in transferring that pathogen to new sites.

Vascular discoloration and foliar symptoms of verticillium wilt © Roland J. Stipes, Virginia Polytechnic Institute and State University, Bugwood.org

Verticillium wilt symptoms look similar to this dieback on a sugar maple © Jason Sharman, Vitalitree, Bugwood.org

Armillaria root rot (caused by *A. gallica* or one of its 12+ relatives) is another pathogen of concern because it is so common on dead and dying trees. These fungi produce resistant elongate aggregations of hyphae called "rhizomorphs" that play some role in survival in hostile environments. *However, survival studies indicate that Armillaria spp. seem to be a more "fragile" group of organisms that do not survive long on chips of any sort and are probably not worth worrying about.*

A dead tree trunk covered with rhizomorphs of armillaria root rot

A third group of microbes that is concerning to plant health care specialists includes organisms in the genus *Phytophthora*. *P. ramorum* gets most of the press recently, but there are other species—like *P. cinnamomi*, *P. cactorum*, and *P. pini*—that have similar growth habits in soil and roots and produce their own long-term survival structures. They most assuredly live in root and lower-stem tissues and they *could* be incorporated into a load of chips moved out of a work site. *Resting spores of Phytophthora spp. typically die at temps above 40°C in less than 30 minutes*.

Second .... the effects of "proper" composting:

In a paper published several years ago in Compost Science and Utilization (Vol. 19, pp 152–162) K. Wichuk and colleagues (University of Alberta) described some important features of wood chip compost management that affect pathogen survival. Most importantly, they learned that *Verticillium* spp. (and presumably most other fungi pathogenic to trees) fail to survive in chip piles where the temperature exceeds 40°C (104°F) for at least five days. At 50°C , the fungi were killed in less than 3 days and at 60°C, just 12 hours was sufficient to inactivate the sclerotia. So what are the features of a chip pile that have temps this high? Imagine a conical pile that is 8 ft. high and 20 ft. diameter at the base, made with fresh but not soaking wet chips. The spot right in the middle can get to 75°C (165°F !!!) in as little as two days and stay that way for a week, then cool to 60°C for two more months. If you mix the pile periodically, then outer layers that would otherwise be cooler also warm rapidly, and frequent turning (like weekly) quickly leaves you with clean chips to be used however you'd like. Failure to turn in that outer layer, however, could leave up to 30% of the volume of the pile "contaminated".

After having looked at what is an admittedly thin amount of reliable data, we're left to conclude that it's probably wise to err on the side of caution with regard to use of fresh waste wood chips. Survival of the few pathogens we know of is a real possibility, at least for several weeks *unless* the chips are held in piles as described above. Then, however, just three weeks with one or two complete turns should leave you with a useful and safe landscape product. By the way, we also found no evidence to indicate that decay of the chips led to reduced nitrogen levels in the soil below. We're not sure where this misconception originated, but as far as we can tell, it's a non-issue. Good luck.

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A wood chip pile heating up and releasing steam.